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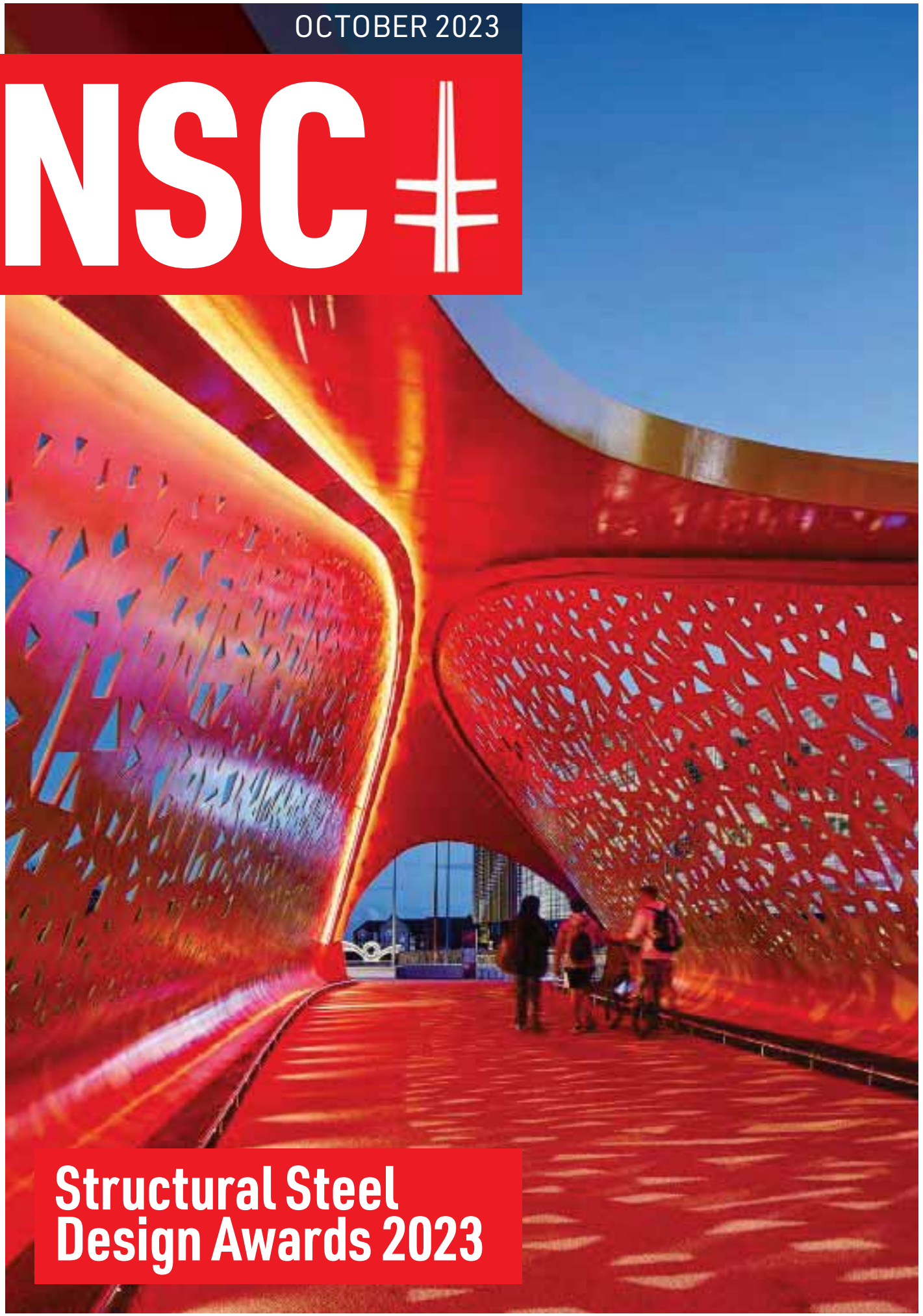

Structural Steel Design Awards 2023

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STRUCTURAL STEEL DESIGN AWARDS 2023

Winners announced at 55th Structural Steel Design Awards


BCSA President, Gary Simmons


SSDA guest presenter Emma Crosby

Five projects were Award winners at this year's Structural Steel Design Awards (SSDA).

The five winning projects at the 55th annual SSDA were Battersea Power Station, London; Copr Bay Bridge, Swansea; HYLO, London; One Centenary Way, Birmingham; and Stockingfield Bridge, Glasgow.

From an initial shortlist of 21 projects, all of this year's entries once again scored highly in terms of sustainability, cost-effectiveness, efficiency and innovation, with six schemes getting Commendations and three collecting Merits.

Jointly sponsored by the British Constructional Steelwork Association and Steel for Life, the SSDA's were announced at an evening reception at Christ Church Spitalfields Venue in east London.

Referring to the SSDA shortlist, British Constructional Steelwork Association President Gary Simmons, said: "The scale, scope and complexity of the projects are a great example of what can be achieved by our steel construction industry, even in challenging times. I would like to congratulate each and every project team for your outstanding achievements.

"I suspect that many of the schemes being celebrated here this evening have benefitted from the early involvement of the steelwork contractor.

"And since one of my aspirations during my term as BCSA President is to raise the profile of the steelwork contractor within the larger project delivery team, what better opportunity than tonight to raise this before an audience of main contractors, engineers, architects and enlightened clients."


Guests await the SSDA announcement

AWARDS

- Battersea Power Station, London
- Copr Bay Bridge, Swansea
- HYLO, London
- One Centenary Way, Birmingham
- Stockingfield Bridge, Glasgow

COMMENDATIONS

- Clery's Quarter, Dublin
- Ed Sheeran Mathematics Tour
- Montacute Yards, London
- The Outernet, London
- SAS13 Bridge Replacement, Birmingham
- Tropical Fruit Warehouse, Dublin

MERITS

- Cody Dock Bridge, London
- Shipbuilders of Port Glasgow
- New Riverside Stand at Fulham FC

NATIONAL FINALISTS

- Farringdon Crossrail Station, East & West Ticket Halls
- Church of Oak Distillery Ballykelly, Co. Kildare
- Dukes Meadows Footbridge, Chiswick
- Arbor, Bankside Yards, London
- The JJ Mack Building, London
- M8 Footbridge, Sighthill, Glasgow
- The National Robotarium, Edinburgh

The Award winning teams

Battersea Power Station, London

Copr Bay Bridge, Swansea

HYLO, London

One Centenary Way, Birmingham

Stockingfield Bridge, Glasgow

NEWS IN BRIEF

Lindapter has announced that its carbon steel, hexagonal head Hollo-Bolts have been independently fire tested under tensile and shear loading with simultaneous exposure to standard fire conditions in accordance with ISO 834/ASTM E-119 for 120 minutes.

Morgan Sindall Construction's Eastern Counties business, alongside property consultants Concertus, have been appointed to deliver a 420-place net zero in operation primary school and pre-school in Lakenheath, Suffolk. The landmark steel-framed school will be a two-storey building, with attached leisure and sporting facilities and soft landscaping outdoor play areas.

ISG has started work on the site of the former Monwel Hankinson factory, Ebbw Vale, to create a new hi-tech post-16 education facility. The 2,000m² facility will provide state-of-the-art training and education for young people and businesses in the fields of robotics, advanced materials and manufacturing, and digital and enabling technologies.

Bruntwood SciTech, a 50:50 joint venture between Bruntwood and Legal & General has appointed GMI Construction for its latest £42M, 11,600m² specialist lab and office workspace. Located within Manchester University NHS Foundation Trust's Oxford Road Campus, it will offer world-leading, highly specialist space specifically designed to support companies working in precision medicine, including those in diagnostics, genomics, biotech, medtech and digital health.

Network Rail has awarded the contract to build the new railway station for Chelmsford's Beaulieu development to **J Murphy & Sons**. The £124M contract includes main construction work for the new station on behalf of partners Essex County Council and Chelmsford City Council. The facility will include three platforms with a central loop line and new tracks to enable stopping services to call at the station, while allowing fast trains to pass through unimpeded.

Structural Steel Design Awards 2023

One Centenary Way, Birmingham
Photo: © Sir Robert McAlpine

HYLO, London
Photo: © Michael Cockerham

The Judges

Roger Plank is a structural engineer and, having recently retired as Professor of Architecture and Structural Engineering at the University of Sheffield, is currently a director of Vulcan Solutions Ltd offering software and consultancy services in fire engineering. He has collaborated extensively with the steel construction sector in the fields of fire engineering and sustainability, and is a Past President of the Institution of Structural Engineers.

Richard Barrett was Managing Director of Barrett Steel Buildings for over 20 years prior to its sale in 2007 in a management buyout, and is Chairman of steel stockholder Barrett Steel. Richard studied engineering at Cambridge University, graduating in 1978. At Barrett Steel Buildings, he developed the business into a leading specialist in the design and build of steel-framed buildings for structures such as distribution warehouses, retail parks, schools, offices and hospitals. He was President of the BCSA from 2007 to 2009, and was a member of BCSA's Council from 1994 to 2017.

Paul Hulme joined Robert Watson & Co as an apprentice draughtsman in 1981. In the following 36 years he held positions in all areas of the company, gaining appreciation of all aspects of the steelwork industry, most recently in the role of Project Director. Over the years Paul has been fortunate to be involved in many complex steel structures, both in UK and abroad. Most notable are Kansai and Hong Kong airports, Terminal 5 roof, London 2012 Olympic Stadium and Wimbledon Centre Court Redevelopment. Paul currently works as an independent consultant offering design and buildability advice to the construction industry. Paul is a Fellow of the Institution of Civil Engineering.

Emily McDonald is a Partner in Buro Happold with over 25 years experience. A civil and structural engineer by training she originally joined the practice as a graduate fresh from Cambridge University. She has extensive experience having worked on a wide range of multi-disciplinary projects including innovative new builds and refurbishment schemes across a number of sectors and typologies. She had been involved in diverse and landmark projects notably Cutty Sark Conservation project and Phase One of the Battersea Power Station redevelopment, now known as Circus West village and Faraday House. She is currently the project principal leading large multi-disciplinary teams of engineers on several projects including: Stratford Waterfront East Bank, and the Barbican Renewal Project, caring for the things people love about the Barbican Centre, while opening up the creative experience for everyone.

Christopher Nash is a senior Consultant Architect. He graduated in 1978 from Bristol University School of Architecture and was a Director and Partner at Grimshaw Architects until retiring from the Partnership in 2012. While at Grimshaw Chris was responsible for many of the practice's high-profile buildings, through which he developed a working knowledge of the steel construction industry. Chris continues to practise as a consultant in architectural practice management, architectural education and property development.

Sarah Pellereau is an Associate Director at Elliott Wood with 21 years' experience. She has been involved in a number of award-winning schemes including leading a project shortlisted for the Stirling prize. As a Structural Engineer, she is rare in having graduated with a Part 1 in Architecture as well as a Masters in Engineering from the University of Leeds. She has a diverse portfolio of experiences in structural design but also has worked on-site with the CTRL alterations to St Pancras Station and tutored at Nottingham University.

Bill Taylor is an architect in private practice. Having joined architects Michael and Patty Hopkins straight from Sheffield School of Architecture in 1982, he became their first partner in 1988. In 2010 Bill left Hopkins Architects to concentrate on his own projects and since then he has also collaborated with architect Robin Snell and his practice. Bill is a founding member of Tensinet, the pan European organisation researching lightweight and tensile construction. He has been a member of the RIBA National Awards Group and CABE Panels and is a Senior Assessor and Client Adviser for the RIBA competitions programme.

Oliver Tyler is Managing Director of award-winning architectural practice WilkinsonEyre. Oliver joined WilkinsonEyre in 1991 becoming a Director in 1999. He has spent over 35 years in architectural practice and has extensive experience in leading and coordinating the design and construction of many high-profile buildings and infrastructure projects. Oliver has led a number of prestigious projects at WilkinsonEyre including Stratford Regional Station in London for the Jubilee Line Extension; the Dyson Headquarters in Wiltshire, regional headquarters for Audi in west London, the Arena and Convention Centre in Liverpool, the Emirates Air Line, the UK's first urban cable car. Oliver has recently completed a number of major infrastructure and commercial office schemes in the City of London, including Liverpool Street Station for the Elizabeth Line, the Bank Station capacity upgrade project, 8 Finsbury Circus and the 50-storey office tower 8 Bishopsgate.

Introduction

By Roger Plank – Chairman of the Judging panel.

This is my first year as chair of the judging panel and I am indebted to my fellow judges for making the role so easy and enjoyable. Each are experts in their own fields of architecture, engineering design and steel fabrication, and give freely of their time to make this Awards scheme such a success. Having returned to our normal pre-pandemic procedures last year we were again able to meet together to examine the schemes submitted and debate their merits, with members of the panel bringing their passion for high quality design and construction in steel.

The Awards scheme provides an opportunity for the sector to showcase excellence in the use of structural steel by practitioners in the UK and Ireland across a wide range of projects varying in scale, regional location and budget. We look for high quality in all aspects of a project, and are particularly interested in those which demonstrate a real commitment to reducing lifetime carbon use.

Again, this year there was a wide variety of entries ranging from the largest prestige city office buildings to elegant footbridges and public sculptures. Following our established practice, we met to make a preliminary selection based on a 'desk-top' examination of the paper submissions to give us a shortlist of projects to be visited. Companies submitting entries should therefore recognize the critical importance of this - a clear, concise, well-illustrated entry highlighting those aspects of the project which make it special will help in making the cut.

The entrants of the shortlisted schemes were all then notified and invited to host a visit by the judges. These visits are a special feature of this Awards scheme, giving the judges a firsthand opportunity to understand and experience the selected projects, and to quiz the project teams about any specific points. In this way we are able to build up a much clearer view of the special merits of individual entries and this is extremely helpful in coming to our final decisions. Again, visits which are represented by an informed, collaborative and enthusiastic team are particularly useful.

Once all visits had been completed the judging panel reassembled to compare notes and exchange views. It is not an easy task to compare such a diverse range of projects, considering their architectural and engineering merits, the quality of fabrication and assembly, any particular innovations or challenges, issues of sustainability, and the contribution they make to society at large. But the judges bring all of their professional experience and expertise to bear and, after a detailed discussion, we were able to reach a consensus.

In conclusion I can say, on behalf of all the judges, that the awards, commendations, merits and national finalists recognised in the Structural Steel Design Awards this year reflect the impressive quality of the current steel construction industry, and everyone involved should be proud of what has been achieved.

SSDA 2023
AWARD

Battersea Power Station, London

The landmark, Grade II* listed and much-loved industrial relic has been sympathetically transformed into a vibrant twenty-first century destination.

FACT FILE
Architect: WilkinsonEyre
Structural engineer: Buro Happold
Principal structural steelwork contractor: William Hare
Architectural structural steelwork contractor: CMF Ltd
Main contractor: Mace
Client: Battersea Power Station Development Company

Originally built in two phases either side of the Second World War, Battersea Power Station has been one of the capital's iconic landmarks for decades as its four chimneys are instantly recognisable to millions of people.

It once supplied around one fifth of London's electricity needs, but was decommissioned in 1983, due to its age and the subsequent output reduction.

After a number of failed attempts to redevelop the site, the power station has now been transformed into a huge mixed-use scheme, which is served by the Northern Line underground extension and sits at the heart of a 42-acre regeneration of this former brownfield site.

Work on the power station constitutes phase two of the project and included the brief to provide 252 apartments, restaurants, shops, cinemas, six floors of office space and an entertainment venue capable of accommodating 2,000 people.

The building can be divided up into a number of elements, consisting of a central boiler house, turbine halls, a switch room and annexes on both sides – east and west. Each of these elements are separated from the adjoining areas by internal walls, which are largely retained elements from the original building.

Within these retained elements, steelwork forms the new amenities with most of the floors having been formed with steel beams supporting metal decking, with the only exception being a few areas on the eastern side where precast elements were utilised for programme reasons.

Erecting these new steel elements was not a straightforward procedure as the entire programme had to be coordinated around a vast array of temporary works and bracings that had been installed to support the existing structure after a partial demolition programme had been completed.

© John Sturrock

The temporary works could only be removed once the new steel frames had been installed and connected to the retained walls, thereby providing the required support.

"One of the biggest challenges was the integration of new steelwork elements and then connecting these to the original retained steel frames," says Mace Project Manager Andrew Barrow.

"Unsurprisingly, a lot of the old steelwork, which dates from the 1930s and 40s was in a poor condition as a lot of water ingress had occurred since the building had been decommissioned. This meant a lot of work was needed to treat the corrosion and rust."

To bring light into the building, the new floors were set back from the north and south elevations of the boiler house, thereby creating tall atria and exposing the as-found condition of the walls. New support was provided through a bowstring truss and façade restraint beams.

Within the boiler house there are five different elements including car park, retail, public/event spaces, offices and residential apartments all

stacked vertically on top of one another. They each required a different column grid pattern and through frame optimisation and organisation of spaces, these stacked usages were achieved with only two structurally super-efficient transfer levels, one of which doubles as a plantroom.

In the historic turbine halls, new structure was introduced behind the delicate heritage fabric, allowing features such as the new retail gallery decks to be introduced in a 'light touch' manner.

This approach required pinpoint accuracy to introduce columns set 75mm away from the existing structure to support new cantilevering turbine hall walkways and a new 13-storey building infill inside the adjacent boiler house.

To facilitate this proximity without compromising existing foundations, buried concrete-encased 24t steel beams cantilever over new piles to support the new columns.

The two turbine halls, which are approximately 150m-long × 25m-wide and 25m-high, house three-level retail zones, topped and spanned by a series of trusses, which support either glazing or roof gardens.

The western turbine hall's trusses date back to the 1930s-original build and have been retained, albeit with some strengthening works. The eastern turbine hall was a later addition, built during the second stage of the power station's construction in the 1950s. These trusses have been replaced with a new set to accommodate the increased roof garden loads. All of the new steel frames are independent structures getting their stability from new concrete cores, which have also been installed within the original structure. However, many of the steel frames are inter-connected to their adjacent frames, via floors and bridges.

At the northern end of the boiler house, framing the entrance to the main retail zone and events space is a large 27m-long × 2.6m-deep plated girder weighing a massive 62t, which is positioned at the underside of the fifth floor. As well as helping to create the large open space below, it also transfers a load in excess of 2,000t down the building, while supporting eight floors above.

The beam, which is one of the largest single pieces of steel to be manufactured in the UK in recent times, was brought to site in one section.

"The operation to transport the beam, lift and install it required detailed planning and close cooperation with our supply chain, local authorities and police. We also had to install one of Europe's largest tower cranes for the job," says Mr Barrow.

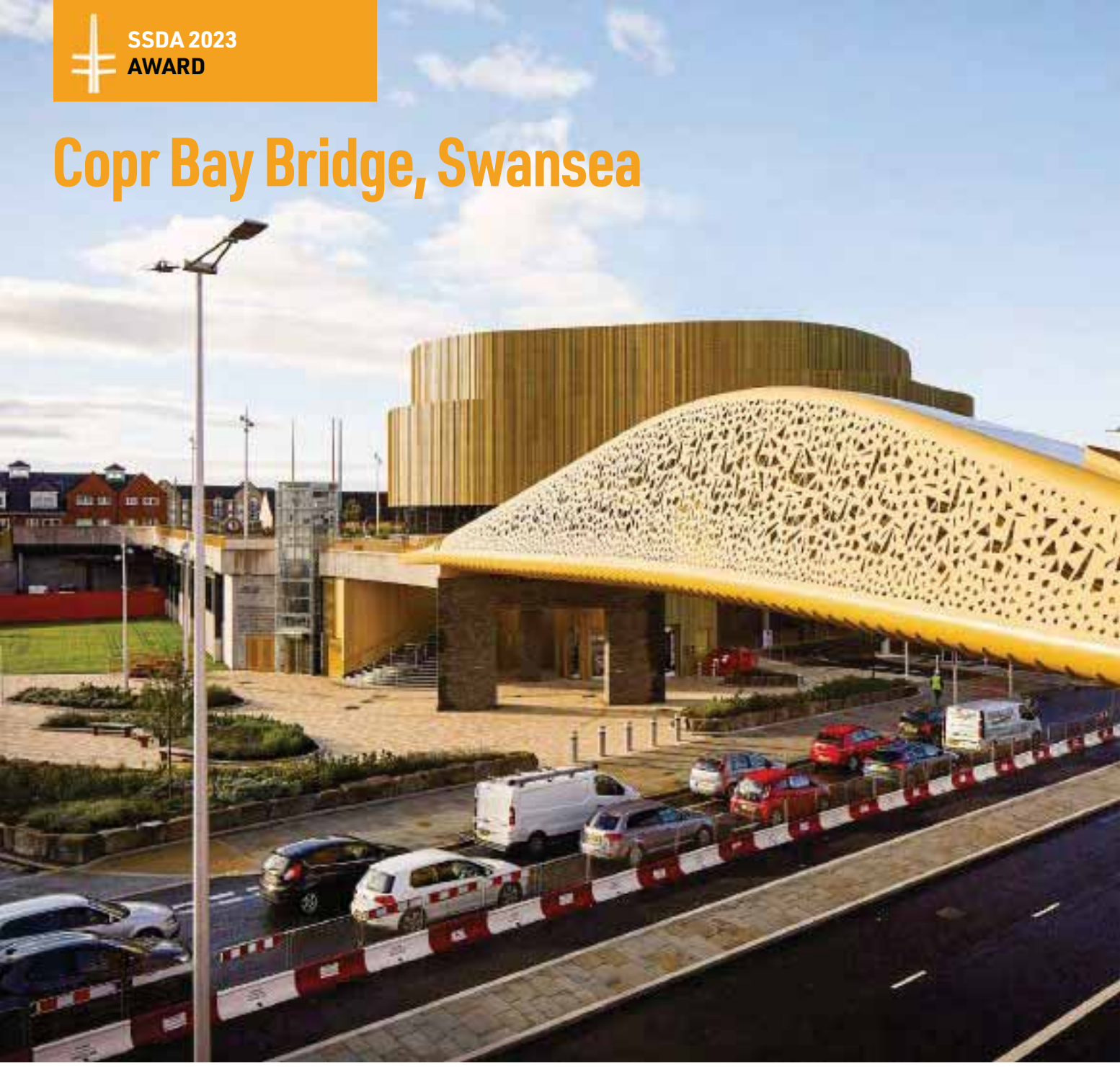
Working in conjunction with the large beam, and also helping to create the events space's column-free interior are two feature 12m-high steel trees, that each support a 30m × 30m floor area.

Principal structural steelwork contractor contractor William Hare delivered each of the two trees in three main elements, with a fully-welded base node weighing 48t being the first part. Four Y-shaped arms, each weighing 43t were then bolted to the node to form the main tree element, along with a further four infill arms, connecting up the main elements. Each tree has an overall steel tonnage of approximately 300t.

Summing up, the judges say the iconic Art Deco Battersea Power Station has been meticulously transformed into a contemporary mixed-use destination. The newly revealed steel structures reflect its industrial legacy, seamlessly integrating with the building's aesthetics. ■

SSDA 2023
AWARD

Copr Bay Bridge, Swansea



A landmark gold-painted steel pedestrian and cycle bridge reconnects Swansea city centre with its renowned coastline and beaches.

Forming an integral part of Swansea's large-scale urban regeneration, Copr Bay phase one has reactivated a previously underutilised plot of land by delivering a state-of-the-art, 3,500 capacity arena, comprising a live performance area and conference centre, as well as new public realm including the city's first new coastal park since Victorian times, high-quality, new social housing and retail space for local businesses.

Creating a highly visual statement and connecting this development to the city centre by spanning Oystermouth Road's six lanes of traffic, a gold-painted steel pedestrian and cycle bridge has been installed.

The completed Copr Bay Bridge is said to provide a new gateway for Swansea and is a celebration of the city's past, present and future.

Designed by a local artist Marc Rees and architectural practice ACME, the 49m-long single span bridge is an eye-catching structure that is 12m-wide x 7.5m-high and has a structural skin of 15mm-thick steel plate. Featuring a distinctive gold paint finish, the side panel plates are perforated with numerous laser profiled cut-outs and pressed into complex shapes.

The design is said to balance a contemporary aesthetic with references that celebrate the city's heritage. The 2,756 laser-cut origami-inspired shapes, each dispersed across the panels, create a visually interesting pattern.

The perforations are abstracted and exploded silhouettes of swans, inspired by the emblematic Swansea bird. The bridge colour and lighting are designed to move in synchronisation with the illuminating facade of the arena, to create a Copr Bay district that pulsates with life at day and at night.

In acknowledgment of Copr Bay's history as the centre of coal and copper production, the bridge is said to have the colour of freshly smelted copper.

The bridge structure offers a degree of protection from the elements. The steel has been rolled into a double curved surface and butt-welded into a single tube. Openings have been cut into the sides where the structural stresses were lower, offering glimpses across the road, the arena and the new coastal park and to allow the bridge to glow at night from within.

ACME Design Director Friedrich Ludewig says: "The iconic arch stabilises the super-slender bridge deck and creates a new urban space floating over the road, enclosed by patterned steel offering

FACT FILE
Architect: ACME
Structural engineer: Ney & Partners
Steelwork contractor: S H Structures Ltd
Client: City & County of Swansea

All images on this spread © Hufton & Crow

glimpses across the road, the arena and the new coastal park.

"The choice of steelwork was primarily because of its structural properties and ability to span large distances. It gave the design flexibility to work with an interesting structural solution, essentially a deformed bow truss formed of plate steel, allowing the creation of the sculptural form, super thin bridge deck, and the opportunity to create a clear identity through the development of perforations in the truss walls and application of a gold paint finish."

Fabricated, supplied and installed by S H Structures, on behalf of the main contractor, the 140t bridge was delivered to site in sections, consisting of four deck pieces, six roof sections and 11 side panels.

The roof sections measured 10.5m × 4.1m × 600mm and the side panels were 2.8m × 6.9m × 15mm.

The largest steel elements to be transported to site and also the heaviest were the deck sections, measuring 24.5m × 6m × 2m and weighing 24.6t each.

"As the deck is only 15mm-thick and needed to be split longitudinal for transportation, the open end was extremely lively, both when being transported and during lifting," says S H Structures Project Manager Will Sharples.

"We had to come up with a bespoke transport lifting beam that strengthened the deck and allowed a multiple eight-point pick up procedure."

Once onsite, the bridge deck was assembled on temporary works positioned in an area adjacent to the bridge's final location. The curved plates, which form the sides, arch and roof were then welded into place, before the complete structure was given its final topcoat of gold paint.

The completed structure was then lifted onto self-propelled modular transporters (SPMTs) and manoeuvred onto its two concrete abutments during a Saturday night road closure.

After the bridge structure was in its final position, the steel deck had an anti-slip resin and aggregate finish applied.

Mr Rees says: "It has been the thrill of a lifetime to be involved in such an iconic part of the regeneration of my hometown. Dylan Thomas infamously described Swansea as an "ugly, lovely town" – whatever the merits of that when he said it, Swansea's aspiration to change, grow and flourish is more than apparent now. The council's transformation of the city is creating a modern, vibrant city and opportunities for residents, artists and businesses, both those who call Swansea their home and those who should."

In summary, the judges say the innovative stressed skin design and the quality of the manufacturing have resulted in an exemplary project. ■

SSDA 2023
AWARD

HYLO, London

A total of 13 new steel-framed floors have been added to a 1960s-built office block, resulting in one of the most pioneering tall building retrofit projects in London.

© Grant Smith

Located just north of the City of London, a 16-storey office block, built in the 1960s, has been reinvented by stripping back the original concrete frame and adding 13 new steel-framed floors to enlarge the structure into a modern 29-storey tower.

The works also included enlarging two podiums that sat adjacent to the building, removing and replacing two existing cores, and substantial strengthening works to the existing columns to allow them to support the extra loadings.

The scheme delivers flexible workspaces together with 25 units of affordable housing, and introduces a new public arcade, with shops, cafes and restaurants that will now transform this area of Islington.

The decision to refurbish and enlarge the building instead of demolishing it and starting afresh, had a number of benefits.

AKT II Associate, Michael Hynd, says: "The primary driver was minimising the embodied carbon of the scheme and being as environmentally-friendly as possible through reusing the inherent capacity in the existing structure.

"It is more sustainable to refurbish and enhance the building as opposed to undertaking a large demolition programme, which was something the local authority and the client was keen to avoid."

This refurbishment and extension solution for the site has doubled the leasable area, from 12,000m² to 25,800m², while saving 35% of the 'up front' embodied carbon in comparison with an equivalent new construction.

Information on the existing building was compiled from a series of engineering record drawings, and a fundamental redesign of the existing building followed an exercise which back-analysed the structure, verifying initial assumptions. This investigation and analysis showed that the original building had residual capacity within the floor slabs, which were believed to have been designed to accommodate printing works on some floors, and also the large diameter under-ream piles, which meant that large portions of the existing building, basement and foundations could be retained and reused.

"This analysis, with finite element modelling of the existing structure and foundation system were key to delivering the 13-storey extension. The whole project represents a best practice approach for the retrofit and large-scale retention and expansion of existing structures," says HCL Managing Director Stephen Cherry.

Although much of the original structure was retained, the building's two existing cores were demolished, as they were too small for the needs

FACT FILE
Architect: HCL Architects
Structural engineer: AKT II
Steelwork contractor: Bourne Group Ltd
Main contractor: Mace
Client: CIT Group

of the enlarged tower, and replaced with a new core configuration that facilitated a more efficient floorplate, while also providing stability for the 13-storey vertical extension.

The choice of structural steelwork for the new upper floors was made due to the material's lightweight attributes, which minimised the additional loading, and speed of construction. No other framing solution would have allowed the existing foundations to be reused, while achieving the desired spans and floor zones in the extension floors.

Throughout the structure, the concrete columns were strengthened with concrete jackets, installed on every floor. The only exception were some areas where the internal architectural vision required a slimmer solution and in these places steel strengthening collars were used.

From level 16 upwards, new steel columns were installed on top of the existing concrete members. However, the existing grid pattern is based around a column spacing of 6.1m × 7.6m. This was deemed to be restrictive for the new floorplates and so some column positions have been omitted, with the upper floors having just one row of internal columns and spans of up to 12m.

All of the steelwork is standard S355 grade, and the beams are all custom-made plate girders, with depths ranging from 525mm to 665mm. Modular pieces for the perimeter, weighing up to 7t, were also introduced to reduce the number of crane lifts. The floorplates are generally repetitive up to level 25, but level 26 has a step-back creating a terrace.

Bourne Steel Project Manager Theodoros Pitrakkos says: "Considerable planning was required to devise a construction programme that allowed the works to be continuous. To achieve this, the floorplate was split into three main areas and the steelwork was built three floors at a time. Primary activities involved welding fittings to cast-in plates in the concrete core walls for beam connections, steelwork erection, metal decking works and on-site painting. These activities continuously rotated throughout the floorplate to meet programme."

With the steel frame starting at Level 16, Bourne's main challenge was dealing with high winds during construction, while maintaining the programme and the tight erection tolerances. Because the site is a confined high-rise plot, there was limited storage space and so the steel was generally erected directly from the delivery trailer by tower crane in conjunction with MEWPS.

According to the client, HYLO is a design-led work and lifestyle office development. As the line between corporate and creative becomes more integrated, HYLO delivers a workplace solution that offers flexible spaces that embrace collaboration and connectivity at the same time.

The tenants enjoy the latest building amenities and specification with unparalleled views across London, while the landscaped roof terraces, breakout spaces and dining areas create a relaxed environment away from traditional desks.

There are generous locker and shower facilities, as well as cycle storage for over 400 bikes, and an expansive ground floor reception incorporating a modern lounge and café.

In summary, the judges say this exemplary transformation of an obsolete sixties concrete 'monolith' was made viable only by the ambition of the client, the skill of the team and the use of structural steel. ■

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© Michael Cockerham

One Centenary Way, Birmingham

Spanning the A38, a 13-storey steel-framed structure, featuring exoskeletons on four elevations, was the first building to be constructed in phase two of Birmingham's Paradise development.

The One Centenary Way project is a stand-out commercial building featuring an expressed steel exoskeleton on all four elevations, while the exposed nature of the steelwork also extends to the interior of the building, where columns, beams and connections are on show.

Below ground level, the steelwork is equally impressive as just over 60% of the total footprint of the building is sat on top of a series of trusses that span the A38 dual carriageway tunnel, a key transport artery through the city. In addition, the site also overlays a major services tunnel.

"One Centenary Way is an important building for the Paradise masterplan because it was the first building of Phase Two to complete. It is also an important building for Birmingham, not least for its green credentials but it's also the first commercial exoskeleton building in the region," says Glenn Howells Architects Partner Dav Bansal.

Approximately 1,950t of the project's overall 7,450t structural steelwork tonnage, was used to fabricate the 12 × storey-high trusses, which are up to 34.5m-long and weigh up 130t.

Fabricated at BHC's Lanarkshire facility, the trusses were transported to site as complete sections, measuring up to 6.15m-wide. Once on site, a 1,200t-capacity mobile crane, one of the largest in the UK, erected each of the trusses.

Ramboll Principal Engineer Daniel Yoxall, says: "Although the trusses were delivered and lifted into place as individual items, 10 of them are installed as pairs, tied together in-situ with cross members, as this configuration was better suited to transferring the loads from the building above to the foundations below. The exceptions are two single trusses at either end."

The trusses form part of the basement level and their top chords help create a platform to support the majority of the building's structural frame. One of the building's two basement levels is accommodated within the trusses' depth. This upper basement floor houses a well-equipped and accessible cycle hub for the whole estate. With up to 350 spaces, this is Birmingham's first city centre major cycle hub offering associated facilities including showers and locker rooms together with servicing and bike hire. The part of this floor level that is not within the trusses accommodates a

© Sir Robert McAlpine

FACT FILE
Architects: Glen Howells Architects
Structural engineer: Ramboll
Steelwork contractor: BHC Ltd
Main contractor: Sir Robert McAlpine Ltd
Client: MEPC

© Greg Holmes

retail basement area and vehicular ramps for the car parking that is also located in the basement.

Due to the tight site constraints, a typical load-bearing core with columns going into the ground to hold the building up and give it stability was not an option. The project's design team's solution was to use the building's façade to provide the stability in the form of a Vierendeel exoskeleton.

As well as the stability provided by the exoskeleton, there is also a centrally-positioned steel braced core that provides some more rigidity.

"The exoskeleton on its own doesn't provide enough stiffness for the overall structure, so the two stability systems work in tandem," explains Mr Yoxall.

The project used a steel core, instead of a concrete one as the former offered a lighter solution. This was important, as the core had to be positioned on top of the trusses, so it could sit in a central position within the building and thereby satisfy the desired internal office layout.

The Vierendeel exoskeleton is formed with a series of vertical and horizontal steel sections forming 12m-wide rectangular boxes. The rectangles incorporate 3m-wide horizontal windows, encased within an exposed structural steel façade. The interior of the building offers large office floorplates, as well as retail space at ground floor level. The column grid is based around a 12m × 9m spacing, as this layout requires minimal internal columns, while also providing the desired modern open-plan office layout.

Within the building, cellular beams have been used throughout to accommodate the building services within their depth. They support metal decking, which along with a concrete topping forms a composite flooring solution for every level above the ground floor slab.

As well as retail, the ground floor also has a triple-height reception area with a floor-to-ceiling height exceeding 9.5m. To accommodate this much higher and impressive reception area, the first floor does not cover the entire building footprint. The upper floors have a standard 3.8m floor-to-ceiling height.

Another unique feature of the building is the lantern area that sits on top of One Centenary Way. The lantern is made up of 504 individual glass units with 576 reflective backing screens. The screens are controlled by a panel that allows over one million colours to be chosen, allowing the building to play its part in supporting and highlighting key dates and causes.

Summing up, the judges say this elegant, exposed steel structure springs off a system of trusses spanning a busy road tunnel. The result, is a high-quality office building with excellent sustainability credentials which has helped transform this area into a pedestrian friendly campus. ■

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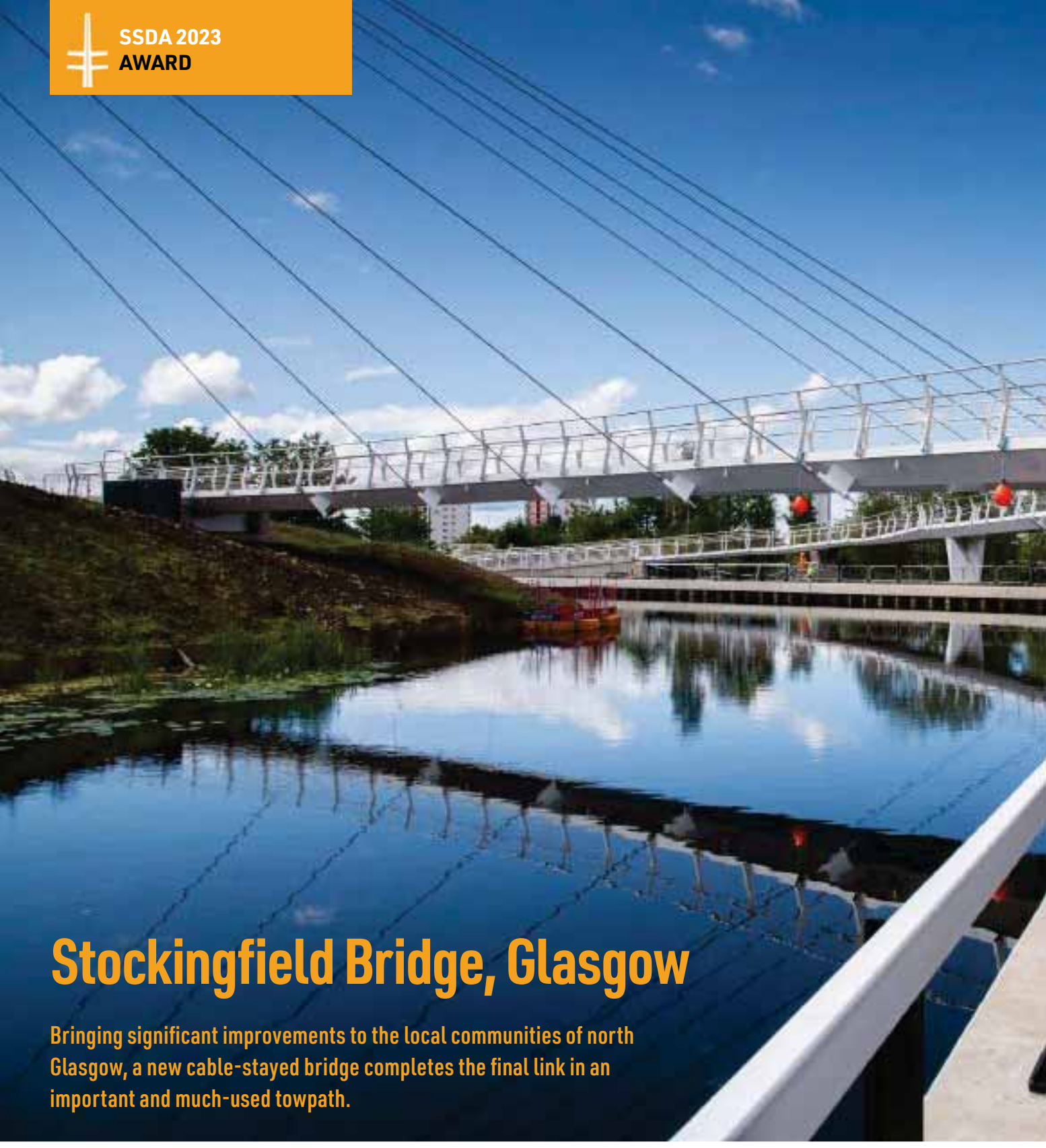
SSDA 2023
AWARD



Stockingfield Bridge, Glasgow

Bringing significant improvements to the local communities of north Glasgow, a new cable-stayed bridge completes the final link in an important and much-used towpath.

Funded by the Scottish Government through Sustrans, and the Glasgow City Council's Vacant Derelict Land Fund, the £13.7M Stockingfield Bridge reconnects the communities of Ruchill, Gilsochill and Maryhill in north Glasgow and completes the last link in the Forth and Clyde Canal towpath.

The two-way spanning cable-stayed pedestrian and cycle bridge opens routes for leisure and to employment opportunities in the west end and city centre. The 3.5m-wide bridge comprises two curved single span decks suspended on a network of cables connected to a single inclined pylon situated on the east bank of the canal.

The new crossing allows pedestrians and cyclists to cross the canal at towpath level rather than having to exit the towpath to use a potentially dangerous road tunnel.

The topography of the site was one of the many challenges faced by the project team. The significant difference in level from the top of the site to the towpath led to a cable-stayed design with a 35m high pylon. At that height, the pylon was potentially unstable in high winds. To overcome this, the natural terrain was used to create a 5m-high platform at the base of the pylon which was tied back into the hillside. This was developed to improve the overall aesthetics of the bridge while providing the community with a viewing platform and, crucially, mitigating the structural effects of wind.

The client was keen that community engagement played a vital part in the project's ultimate success. Residents and community groups were consulted from concept to completion giving them a real sense of ownership. High on the residents' original wish list were attractive landscaping, a viewing point, and the inclusion of public art, all of which have been provided.

In addition, to ensure that the space is safe

FACT FILE
Architect: Jacobs
Steelwork contractor: S H Structures Ltd
Main contractor: Balfour Beatty
Client: Scottish Canals

for female users, the project team worked with a Glasgow violence against women and girl's charity, Wise Women. As part of this collaboration, local women visited the site and provided feedback on lighting, access, and layout.

The existing site included an area of waste land. This has been landscaped with the introduction of trees, shrubs, and hedges, 65% of which are native species, which provides a safe, public space, where anyone can access the community observation platform to enjoy the canal and surrounding area.

Following the initial community engagement 14 submissions were received for potential artwork to be included on the site with eight being selected. These include ceramic panels and paving stones based upon community-produced artworks.

The steel fabrication and assembly of the bridge and mast also presented a number of challenges. Heavily plated structures, such as the bridge's curved, tapering, trapezoid-shaped twin decks, are prone to weld shrinkage and distortion during fabrication.

The use of bespoke jigs, welding control and dimensional monitoring were all employed to eliminate the risks. The project team also redesigned the internal stiffening configuration of the bridge decks to reduce the number of longitudinal stiffeners and transverse diaphragms, used to control plate buckling, by up to 50%. This reduced not only the steel weight, saving both cost and carbon, but also, crucially, the amount of welding required, which in turn reduced heat induced distortion.

"Other materials for the bridge were considered, such as concrete and timber," says S H Structures Sales Director Tim Burton. "Steel was selected as it was the most structurally efficient and cost-effective solution."

The construction team considered various options for the installation methodology. Taking into consideration time, cost, safety and environmental issues, the solution chosen required the temporary closure of the canal. The waterway's sides were protected with sheet piles and, using carefully selected fill material, temporary working platforms, or causeways, were created within the waterway to facilitate the bridge construction.

The complex nature of the project combined with the restricted sloping site demanded close collaboration between the various contractors to ensure the project was installed safely and efficiently.

The reduction of carbon within the construction played an important part in the design and the selection of materials. Various initiatives were introduced to reduce the carbon footprint of the project, through design. As well as the redesign of the bridge decks' internal stiffening, these included the reuse of the temporary causeway material as part of the site's landscaping, the use of recycled materials in the asphalt and the use of more sustainable cement replacements in the concrete mixes. The project also recycled 3.75 tonnes of plastic waste.

Officially opened on 3rd December 2022, the project has been overwhelmingly welcomed by the community it serves, who demonstrated their support for the project by turning out in their hundreds to witness the opening ceremony.

Summing up, the judges say this is a well-conceived, finely executed project providing significant practical and social value with new links between disconnected communities and much needed pedestrian and cycle routes across a canal and adjacent road. ■